I T CAN BE DAUNTING to teach environmental education on some school campuses. Often, the schoolyard is surrounded by little more than a thin line of vegetation or is landscaped with heavily manicured grass and non-native trees and shrubs. Fortunately, nature is dynamic, and even in urban and suburban settings remnants of original habitats can be found in fencerows and stands of coniferous or deciduous trees growing around the campus. Such remnants provide opportunities to research the original habitat and to investigate the species that continue to thrive in the schoolyard. Nature mapping is a valuable tool for these activities, as it not only provides a reason for exploration but also encourages students to complete the “blank spots,” to seek out places they have not yet explored.

Beginning to map
As a starting point for mapping, I ask students to map as many features of the schoolyard as they can remember and to create their own legend to these features. This can be done either individually or in groups, depending on the age and number of students. With students under 12 years of age, I usually draw a map on the board and let them fill in the details. I then have them draw a copy of this map to the best of their ability. This form of mapping is like a memory game; it pushes students to the edge of their knowledge, drawing their mind’s eye to details they have grasped through everyday experience of their surroundings. It is enough at this point to provide paper, pencils, erasers, markers and crayons. Leaving out rulers allows for a more artistic course and enables students to focus on the flow of knowledge without worrying about such details as which building is larger. Even with older children (12 years and up), I encourage free-form mapping before introducing the concepts of scale and orientation (which are excellent for incorporating math skills). I also have students compare their maps. Research shows that age and cognitive development determine perception and mapping ability. By viewing each other’s maps, they can gain understanding that there is more than one way to perceive and interpret the world around them.

I have found that when mapping nature, aerial views are best because they are easy to adjust over time. If the school

Nature Mapping
Schoolyard nature mapping teaches basic mapping techniques and encourages close observation of plants and animals through the seasons

by Mark Batcheler
campus is too large for young students to map (has too many buildings, fields, sidewalks, etc.), consider designating the classroom as the center point of the maps. Then expand students’ awareness by sending them out further and further from the classroom to record the locations of buildings, patches of vegetation, trees and so on. As students become more familiar with their campus, they may change the orientation of their map as it suits them.

When students have completed their maps from memory, I have them explore the school campus with the intent of making corrections and filling in the blank spots on their maps. Depending on the size of the class and age of the students, it may be appropriate to have them work in groups. Once this primary map is completed, they can begin to focus on the plants and animals that make nature mapping a dynamic process.

Once students have workable maps of the area they will be studying, I make several photocopies of their maps. They use these copies to create separate maps for different categories of information. On one map, they may record plant species and their locations, while another map may be a record of bird sightings, and others may show mammals and trees. Later on, students can, individually or in groups, create a master map that has all of these elements. A benefit of creating multiple maps with different categories is that it provides meaningful repetition. The map image becomes fixed in the students’ minds so that when they find a plant or identify a bird, they know exactly where to record that sighting on the map.

Mapping plants and trees
As students begin to map plants and trees, the vegetation in the schoolyard becomes more than a wall of green, and plants become more than “flowers” or “weeds.” This takes some time, but the reward is great. I follow a simple process of identifying vegetation that seems to work well. First, students determine the plant type: Is it a shrub or vine? Second, they identify the leaf structure: Are the leaves at the base of the plant? Are they alternate like footsteps or are they opposite like our arms? Are they in whorls that look like an umbrella? Third, students take a look at the flower. How many petals does it have? Is the flower round and symmetrical or does it have some other, less symmetrical shape?

Older students can draw the plants, record key features and delve into classification, but simply identifying whether a tree is an oak or stating that there is grass in the field is a good start for most ages. Field guides are helpful aids: Golden Guides are excellent for younger students, while older students may use Peterson’s or Audubon field guides. I find that side projects such as plant pressings and leaf rubbings promote pattern recognition, mental images that students can later draw on in identifying plants. It is important to remember that it is not necessary to identify every plant in the schoolyard; I find it best to send students on separate hunts, each for a particular plant, such as a dandelion. This way, at the end of an hour we have a large amount of information to put on a map.

Putting it on the map: Vegetation can be drawn on a map in various ways. A method that landscapers use is to designate each plant with an aerial view of the plant’s canopy and then label it. It is also acceptable to mark an “x” on the map at the location of each tree, bush or plant, and label it. I find that students generally prefer to draw the silhouette of the plant and place the name of the plant next to it.

Mapping birds
One of the best approaches I have found for mapping birds is to map the place where students eat outside in the schoolyard. Birds such as crows, house sparrows and starlings move in very quickly when lunch hour is over, and students can sit off to the side and watch as the birds devour food scraps. Mounting birdfeeders is another effective means by which to attract birds for observation, and they are exciting to watch, especially when several feeders or various types of feed are used. Suet, sunflower seeds, safflower seeds and other foods can be used in separate feeders or in rotation to bring in a variety of species.

Feeders should be placed at several locations around the school campus in a variety of habitats to ensure that they attract a wide variety of bird species; scattering the feeders will also mean that bird sightings are not concentrated in one area of students’ maps. Place feeders in trees, in shrubbery and, of course, near a window to allow for easy viewing. While many Audubon field guides are kid-friendly and bioregionally specific, it may be helpful to photocopy pictures of common birds and place them near the feeders to ensure proper identification. Although feeders are artificial larders, it is likely that many of the birds that visit them will be native to your area. Since many species are migratory and vagrants do occur, bird mapping should continue throughout the school year.

Putting it on the map: One method of mapping bird sightings is to label identified individuals (for example, the crow with a wing feather missing), but such specific identification is difficult. Another method is the one used on the Christmas bird counts that take place throughout North America. Species are identified and the number of individuals of each species sighted is counted and noted on the map (for example, 20 house sparrows near the baseball field). I suggest having the students draw a silhouette of a sparrow in the baseball field on the map and note beside the silhouette the name of the species and the total number seen. There is no right or wrong way to record sightings of birds, as long as
the method used ensures that the data will be meaningful to both teacher and students.

Mapping mammals
Having feeders or any source of food around is bound to attract mammals, which to children are the most exciting animals. Unfortunately, mammals tend to be secretive and many are nocturnal, and children eager to see them may be disappointed when they do not. Fortunately, as biologists have long realized, it is possible to identify traces of the presence of mammals without having to see the animals. I have students determine what animal signs indicate the presence of specific mammals. For example, most children know what dog or cat scat looks like, and this is a reliable source of information. Another is animal tracks. Signs of digging and chewing on plants, and trails in deep vegetation are also valid indicators of the presence of animals, but they are less useful because a great deal of investigation would be required to determine what animal made them.

Besides the traces that animals leave, another source of information about animals on the school campus may be the groundskeeper or the maintenance staff who come and go in the evening when animals are active.

As when mapping birds, it is helpful to identify the food sources and types of shelter that attract mammals. One method — my favorite — is to set up a “flour trap” by spreading flour around a four-foot area near a dumpster or a vegetable garden. It is likely that the tracks of a house cat, a raccoon or even a skunk or opossum will be evident the next morning, providing students an opportunity to “collect” clear mammal tracks in the flour. Have students measure and draw the tracks and then identify them using any of the several excellent books available on identifying animal tracks.

Putting it on the map: Have students draw a silhouette of the animal or a picture its track in the area on the map where the track was found. Identifying the species is more important than counting the number of individuals.

Mapping invertebrates
Teaching students the roles of the various invertebrates they encounter on the school grounds and elsewhere is important to fostering their understanding of ecology and their empathy for other creatures. Most invertebrates are detrivores that break down organic matter and thus aid in recycling nutrients. Invertebrates also serve as the foundation of many food webs.

Give students hand lenses and let them go out into the schoolyard. Follow them with a Golden Guide to insects or any other simple field guide to invertebrates. Looking for ladybugs, moths, butterflies, snails and spiders can be, in the minds of children, like going on a hunt for the great mammals of Africa. When beginning bug hunts with students, identify only a few species at first and later broaden the search. Grassy areas, wet areas, school gardens and areas near outdoor light fixtures are good places to start. Often, invertebrates are found in areas that humans do not frequent. If students are having trouble finding them, place a white sheet under a tree or bush, shake the vegetation vigorously (but do not damage it), and then examine the creatures that have landed on the sheet. Another method is to place a piece of cardboard or wood over low-growing vegetation, such as grass; after a few days, carefully remove the covering to reveal several species. Bug-viewing containers that incorporate a magnifier help in identifying small creatures.

Be aware of one possible hazard when collecting small creatures on a school campus: any pesticides or herbicides used will not only greatly reduce the number of invertebrates but also can be hazardous to students’ health. Check with your school administrators to find out if and when such materials are used on campus.

Putting it on the map: Invertebrates are almost always found in large numbers, and they may therefore be difficult to count. Have students mark their location on the map with a drawing and estimate their number. It is best to focus on no more than ten species, as maps may become overwhelmed by data on these amazing creatures.

The big picture
Once the students have collected plenty of data on both animals and plants, they can create a master map. This can be done on a whiteboard or on chart paper. Students may make their own master maps as well, although making one big class map allows everyone to contribute to the perspective of the map and the data collected. By merging the animal and plant data they have collected on one map, students can instantly see how these elements are tied to each other. For example, birds are most likely to be found where there is vegetation, and this is where invertebrates are found also. Let students make their own connections and conclusions about their findings and mapping techniques, as doing so is part of the scientific process.

Finally, I encourage continuous nature mapping. All forms of mapping involve data collection, but collecting and mapping information about plants and animals teaches us to pay attention to our surroundings and reminds us that our environment is dynamic. With their first maps, students have created only a snapshot of the life in their community. Continuous observation and mapping of the natural world as it changes through the seasons and over time will help to foster bioregional literacy and a deep and personal connection with the Earth.

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